ORIGINAL RESEARCH PAPER

ROLE OF NARROW BAND IMAGING IN DIAGNOSIS AND DIODE LASER IN MANAGEMENT OF PREMALIGNANT LESIONS OF ORAL CAVITY AND ORO PHARYNX

ENT

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ABSTRACT

Head neck tumors are Heterogenous group of cancers arising from different anatomical parts with different predisposing factors prevalence and outcomes. The most common type of cancer in the oral cavity and oropharynx is called squamous cell carcinoma. Narrow band imaging (NBI) is one of the most frequently used optical digital methods of performing non-invasive image-enhanced endoscopy . The gold standard for management of the clinically more suspicious high-grade premalignant lesions is excision or laser ablation. Laser is an advanced technology receiving a lot of attention in research because of its advantages compared to other ablation techniques, such as higher efficacy, safety and precision, and shorter time period treatment needed to achieve the same result.

INTRODUCTION

Head neck tumors are Heterogenous group of cancers arising from different anatomical parts with different predisposing factors prevalence and outcomes . Depending on the location, the cancer can cause abnormal patches or nonhealing ulcers in the mouth and throat, unusual bleeding or pain over lesions , sinus congestion that does not clear, sore throat, earache, pain during swallowing or difficulty swallowing, a change in voice, difficulty in breathing, or enlarged lymph nodes [1] Oropharyngeal cancer is cancer in the oropharynx, which is the middle part of your throat (pharynx). Symptoms include a sore throat that doesn't go away; a lump in the throat, mouth or neck, white patch in the mouth and other symptoms[1] The most common type of cancer in the oral cavity and oropharynx is called squamous cell carcinoma .These cancers start in the squamous cells that line the mouth (oral cavity) and the middle part of the throat (oropharynx)[2] .Risk factors are smoking and use of other tobacco products are well-known. Consumption of other forms of tobacco, such as smokeless tobacco, snuff and paan (areca nut, tobacco, betel leaf, snuff, chewing tobacco, slaked lime, spices), are prevalent throughout the developing countries of the world.[3] The management of oral carcinoma leads to both cosmetic and functional deficit to the patient and the histopathology report is a more time consuming which may be a reason for a reduced follow up visits and compliance of the patient. There is a need for a non-invasive and time saving diagnostic tool for early diagnosis and management of premalignant and malignant oral lesions in its earlier period. [4] . Narrow band imaging (NBI) is an optical digital method of image-enhanced endoscopy technique is one of the most frequently used optical digital methods of performing image-enhanced endoscopy.[5] It basically works on the principle that hemoglobin is a chromophobe which absorbs narrowband width light and displays the lesions and vascular loops much brighter than white light endoscopy in vivid background. vascular loops gave us a positive correlation with histopathology report which helped in better and prompt planning of treatment. Laser is an advanced technology widely applied in medicine and dentistry, minimally invasive to tissue, and allowing excellent wound healing [6] . This minimally invasive method does not require sutures and allows shortening duration of treatment, which represents a decisive benefit for the patient. The gold standard for management of the clinically more suspicious

high-grade premalignant lesions is excision or laser ablation . Depending on the specific application, different types of lasers can be used. Neodymium:yttrium-aluminium-garnet (Nd:YAG) lasers (wavelength of 1064 nm) and diode lasers (wavelength of 800–900 nm) , CO_2 lasers (10,600 nm) are used in cancer treatments. Laser therapy is receiving a lot of attention in research because of its advantages compared to other ablation techniques, such as higher efficacy, safety and precision, and a shorter time period treatment needed to achieve the same result[7]

AIMS AND OBJECTIVES

To study the sensitivity, specificity of Narrow band imaging in the diagnosis of oral, oro pharyngeal premalignant lesions in comparison with white light endoscopy and evaluate the Effectiveness,Safety ,Convenience of diode laser for treatment of the pre-malignant lesions in oral cavity and oropharynx.To study the prevalence of oral pre- malignant lesions with addiction to tobacco chewing & smoking.

MATERIALS AND METHODS

Present study was conducted in our department from March 2020 to March 2021 attending OPD at Department of ENT .Total 50 cases included in this study were clinically diagnosed and identified with white light and Narrow band imaging . Patients presenting with complaints of non healing ulcers in oral cavity, pain over the ulcers, patchy lesions in oral cavity and difficulty in swallowing and Patients with suspected oral and oropharyngeal premalignant lesions in Age groups above 20 to 80 years are included in study . Patients who are not giving consent for the study and Already biopsy proven cancerous patients are excluded from the study criteria.

• **WHITE LIGHT ENDOSCOPY AND NBI**

WLE leucoplakia on buccal mucosa
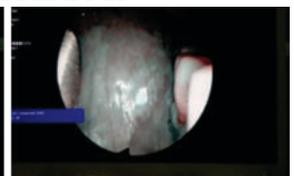
NBI showing vascular loop IPCL Type 1

- **DIODE LASER EXCISION**

Fig – Diode laser excision   **Fig - Postop wound healing**

OBSERVATIONS AND RESULTS

Table 1. Distribution of patients based on age.

Age (yrs)	Number of cases	Percentage (%)
20- 30	5	10
31-40	9	18
41-50	18	36
51-60	11	22
61-70	4	8
71-80	3	6
Total	50	100

Table 2. Distribution of Patients based on Gender.

Gender	Number of cases	Percentage (%)
Male	41	82
Female	9	18
Total	50	100

Table 3 Distribution of patients based on findings of substance abuse.

Adverse habits	Number of cases	Percentage (%)
Smoking and alcohol	12	24
Tobacco chewing	27	54
Both	10	20
No History of substance abuse	1	2
Total	50	100

Table 4 Distribution of patients based on findings of clinical examination.

Types of lesion	Number of cases	Percentage (%)
Leukoplakia	9	18.0
Ulceroproliferative growth	24	48.0
Ulcerative growth	10	20.0
Erythroplakia	4	8.0
Verrucous growth	3	6.0
Total	50	100.0

Table 5 Distribution of patients based on types of Intra-epithelial papillary capillary loops (IPCL) seen on Narrow Band Imaging.

Intraepithelial papillary capillary loop	Number of cases	Percentage (%)
Type 1	27	54
Type 2	13	26
Type 3	8	16
Type 4	2	4
Total	50	100

Table 6 Association between IPCL and Histopathological Diagnosis.

		Intra-epithelial papillary capillary loops				Total
		IPCL 1	IPCL 2	IPCL 3	IPCL 4	
Histo-patho logy	Hyperplasia /dysplasia	7 (100 %)	0 (0%)	0 (0%)	0 (0%)	7 (100 %)
	Carcinoma in situ	2 (100 %)	0 (0%)	0 (0%)	0 (0%)	2 (100 %)
	Well differentiated squamous cell carcinoma	14 (50.0%)	11 (39.3%)	3 (10.7%)	0 (0%)	28 (100%)
	Moderately differentiated carcinoma	3 (33.3%)	2 (22.2%)	3 (33.3%)	1(11.1%)	9 (100%)
	Poorly differentiated carcinoma	0 (0%)	0 (0%)	2 (66.7%)	1 (33.3%)	3 (100%)
	Verrucous carcinoma	1(100%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)
Total		27 (54.0%)	13 (26.0%)	8 (16.0%)	2 (4.0%)	50 (100%)

Table 7 Correlation between the diagnosis made using WLE and histopathological examination.

		Histopathology		Total
		Malignant	Benign	
White Light Endoscopy	Malignant	39	0	39
	Benign	2	9	11
Total		41	9	50

Kappa correlation coefficient- .875, p value-<.05

The kappa correlation coefficient value .875 indicated almost perfect agreement between the observations of White light endoscopy and Histopathology. This agreement was statistically significant (p value<.05).

Sensitivity of WLE in detecting malignancy= 39 / (39+2) = 0.9512
Sensitivity of WLE in detecting malignancy is 95.12%.
Specificity of WLE in detecting malignancy = 9 / (9+0) = 1.0
Specificity of WLE in detecting malignancy = 100.0%
Positive predictive value of WLE in detecting malignancy= 39 / (39+0) = 1.0
Positive predictive value of WLE in detecting malignancy= 100.0%
Negative predictive value of WLE in detecting malignancy= 9 / (9+2) = 0.8181
Negative predictive value of WLE in detecting malignancy= 81.81%

Table 8. Correlation between the Diagnosis made using Narrow band imaging and Histopathological examination.

		Histopathology		Total
		Malignant	Benign	
Narrow Band Imaging	Malignant	40	1	41
	Benign	1	8	9
Total		41	9	50

Kappa correlation coefficient- .864, p value-<.05

The kappa correlation coefficient value .875 indicated almost perfect agreement between the observations of White light endoscopy and Histopathology. This agreement was statistically significant (p value<.05).

Sensitivity of NBI in detecting malignancy= 40 / (40+1) = 0.9756
Sensitivity of NBI in detecting malignancy is 97.56%.
Specificity of NBI in detecting malignancy = 8 / (8+1) = .8888
 Specificity of NBI in detecting malignancy = 88.88%
Positive predictive value of NBI in detecting malignancy= 40 / (40+1) = 0.9756
Positive predictive value of NBI in detecting malignancy= 97.56%.
Negative predictive value of NBI in detecting malignancy= 8 / (8+1) = .8888
Negative predictive value of NBI in detecting malignancy= 88.

Table9 Description of Post-operative complications amongst the patients who had excision of lesion using DIODE LASER.

N= 9		Imme-diate	Day 7	Day 15	1 month	3 month
Pain	Mild	2 (22.2%)	1(11.1%)	0 (0.0%)	0 (0.0%)	-
	Moderate	1 (11.1%)	0 (0.0%)	0 (0.%)	0 (0.0%)	-
	No	6 (66.6%)	8 (88.8%)	9(100.0%)	9 (100.0%)	-
Bleeding	Yes	3 (33.3%)	-	-	-	-
	No	6 (66.6%)	-	-	-	-
Edema	Present	3 (33.3%)	1 (11.1%)	0 (0.0%)	-	-
	Absent	6 (66.6%)	8 (88.8%)	9 (100.0%)	-	-
Infection	Present	-	1 (11.1%)	0 (0.0%)	0 (0.0%)	-
	Absent	-	8 (88.8%)	9 (100.0%)	9 (100.0%)	-
Slough	Present	-	3 (33.3%)	0 (0.0%)	-	-
	Absent	-	6 (66.6%)	9 (100.0%)	-	-
Scar	Present	-	-	-	1 (11.1%)	0 (0.0%)
	Absent	-	-	-	8 (88.8%)	9 (100.0%)
Re-currence	Present	-	-	-	0 (0.0%)	0 (0.0%)

DISCUSSION

In total of 50 patients, 41 males (82%) and 9 females (18%) and male to female ratio was 4:1. The most common age group is 5th decade (41-50yrs) as 36% and second most common 6th decade (51-60 yrs) as 22 % Most common site of lesions are buccal mucosa 27 cases (54%) followed by tongue 9 cases (18%). Most common substance abuse are tobacco chewing cases 27 (54%) and second most common are smoking 12 cases (24%) .Upadhay A et al (2019) [4] found that maximum in age group in 5th decade and second most common is 6th decade. In this study examination of lesions under narrow band imaging was done and vascular loop were graded into four types based on their appearance in which type 1 intra epithelial papillary capillary loop was the most common % followed by type 2 IPCL with 36.3 % type 3 with 20 2.7 % followed by type 4 with 2.2 % of the cases. Shih wei yang et al [8] in his study found that IPCL type 2 was most common with 38 cases (52.8 %) followed by IPCL type 3 with 25 cases of 30 4.7 % followed by type 1 and type 4 . Shih wei yang et al found that type 4 for correlated with invasive carcinoma among 25 type 3 IPCL ,14 cases 56% were carcinoma in situ lesions while others were low or moderate dysplatic lesions . Takashi kumamoto et al (2012) [9] found the efficacy of NBI in diagnosing the hypopharyngeal lesions . the identification of IPCL type is more subjective and it is often associated with intra and interobserver variations .In this study the sensitivity ,specificity PPV ,NPV of WLE are 80,100 100,35.71 respectevily and NBI 95.5 80,97.72, 66.66 respectively and P value is 0.003.In our study sensitivity , specificity ,PPV NPV of WLE are are 95.12% 100% 100% and 81.81 % respectively sensitivity , specificity ,positive predictive value ,negative predictive value of Narrow band imaging are 97.56% 88.88% 97.56 and 88.88 % respectively .The P Value of NBI on the earlier diagnosis of oral premalignant and malignant lesions is 0.05 which is significant. Vu en et al 2014 [10] studied the efficacy of NBI for the detection of potentially malignant and malignant oral and oro pharyngeal lesions . the sensitivity ,specificity ,PPV ,NPV and accuracy for WLE ranged from 56-96% , 60 -100% ,33-100% ,87 -99%, and 66-89 %respectively

where it was 87-96% ,94-98 %,73-96%, 97-98% and 92-97 %respectively for Narrow band imaging .Goharkhay et al [11] 1999 in their study showed that the diode laser is a very effective because of its excellent coagulation ability. The overall summation of the results of the study showed that laser therapy (Diode) offered better clinically significant results in the management of premalignant lesions.

CONCLUSION

In the developing countries the incidence and the prevalence of the head and neck cancer is increasing even mostly due to changes in the lifestyle and increase in tobacco and alcohol addiction. Identification of these tumors in a very early stage is challenge but now with the technological and scientific development it becomes practically possible in the present medical era. Narrowband imaging is one among them which helps in identification of lesions in pre malignant stage so that prompt treatment can be instituted at the earliest at an early stage. We insist and emphasize the point that histopathology still a gold standard to diagnose and stage any malignant are premalignant lesion and its role will always prevail. So NBI is not a substitute for histopathology examination but a good adjunct .

Diode laser is an excellent tool for excision of premalignant lesion by early diagnosis and histopathology report. We hope our study throw some light into the area so for not much touched in the field of otolaryngology and will be welcoming more research this prospective tool called NBI and Diode laser and better understanding and confidence along with large sample population .The main purpose of treating oral premalignant lesion is to prevent transformation into malignant form. Excision of precancerous oral lesion using diode laser offers several advantages like bloodless field, minimal post-operative pain and quicker healing.

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